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ABSTRACT

Alternative assessment ideas are presented in an effort to help teachers understand how and why alternative assessment is necessary. Suggestions for preservice teachers in mathematics that meet the National Council of Teachers of Mathematics (NCTM) Assessment Standards are included. Portfolios and reflection rubrics are presented as possible examples of alternative assessments. (SAH)

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How and Why Do We Use Alternative Assessment?

Cathy Liebars

The traditional methods of assessment in mathematics courses have consisted of exams, quizzes, and/or textbook exercises. Thus the pre-service elementary teacher enters the elementary mathematics methods course with a similar expectation for assessment. The current reform movement in mathematics education spurred by the release of the NCTM's *Curriculum and Evaluation Standards for School Mathematics* (1989) calls for "student assessment integral to instruction" and "multiple means of assessment methods". The *Professional Standards for Teaching Mathematics* (NCTM 1991) also highlights the importance of the need for teachers to reflect on their practices and to use alternative-assessment methods. Mathematics teacher educators must intervene and model these practices in the methods and/or content courses for elementary education majors. In the words of the *Standards* (NCTM 1989, 190),

"Merely adding scores on written tests will not give a full picture of what students know. The challenge for teachers is to try different ways of grading, scoring, and reporting to determine the best ways to describe students' knowledge for mathematics as indicated in these *Standards*."

It is not enough to just preach about alternative assessment. If pre-service teachers are expected to adopt multiple assessment methods, then they must experience them as students. By using multiple methods of assessment, such as portfolios, writing, presentations, and projects, the teacher educator is not only modeling behavior for the pre-service teachers, but also assessing the learning and understanding of the students.

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One of the major concerns with using these forms of assessment is that of grading. How do we evaluate performance-based assessment? How time-consuming is it? These are questions I will address in this paper.

Reflections

The course that I teach is taken during the junior professional semester in which the student spends a full day (or two half days) each week and two full weeks at the end of the semester in an elementary classroom. This provides a wonderful opportunity for the students to try ideas they learn in class and to reflect on themselves as classroom teachers. An appropriate outlet for this reflection is a journal.

I've used various formats for the journals, including open-ended reflections and responses to prompts. Open-ended reflections consist of essays in which the students write about what they learn in class and reactions to the activities encountered. Some students ask questions about topics covered in class or express concerns about the class, teaching, or mathematics in general. I also ask them to include reflections about their observations and mathematical experiences in the elementary classroom in which they are placed for the semester. When I give the students prompts to which they should respond, I try to use topics that could be used or adapted for use with elementary students. Some favorite prompts are:

- What math means to me
- Explain to someone how to model 23 x 5 using the base-ten blocks and how to record the solution (or some other process involving manipulatives)

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- Write about an example of patterns in everyday life
- What would life be like without _____? (Fill in the blank with a geometric shape.)
- Write a paragraph or a poem about "What I would do if I were a _____" (Again, fill it in with a geometric shape.)
- Which are you more like: a circle or a square?
- Pretend you are one centimeter tall and live in the real world. Write a story to describe how ordinary things look when you are one centimeter tall.

The Portfolio

At the end of the course, the students develop a final portfolio to showcase their learning and accomplishments throughout the semester. The items are selected based on a given list of criteria:

1. Demonstration of positive mathematical disposition.
2. Demonstration of communicating mathematically.
3. Demonstration of mathematical reasoning skills.
4. Demonstration of problem-solving skills.
5. Demonstration of mathematical connections (to the real world, to other subject areas, to other mathematical topics, ...)
6. Demonstration of knowledge of the use of tools (technology, manipulatives, ...)
7. Demonstration of the most important learning for you this semester in the area of learning and teaching mathematics.
8. Your favorite work.
9. Any other issues or concerns that you want me to know that acknowledges your growth of learning during this course.

Students choose assignments, journal entries, and professional articles, as well as lesson plans and assessment instruments they created, to put in their portfolios. For each item selected, students write a rationale explaining why they made that particular selection.

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Evaluation

Rubrics are used to evaluate the reflections and portfolios. Reflections are evaluated based on a two-point holistic rubric:

Reflection Rubric

2 – Thoughtful reflections which are supported with valid reasons
1 – Reflection submitted with mostly factual statements and little thinking
0 – No reflection handed in

This was created to avoid the possibility of a reflection consisting of a summary of classroom events with little or no reflection on these events. An analytic rubric is used to evaluate the final portfolio with five possible points for each category:

Organization & Presentation
5 – Creative, professional appearance, well-organized and easy to find required contents
4 – Professional appearance, well-organized and easy to find required contents
3 – Well-organized and easy to find required contents
2 – A bit disorganized and difficult to find some contents
1 – Disorganized

Technical Quality
5 – High quality writing; almost no, if any, typos, spelling and/or grammatical errors
4 – Good quality writing; few typos, spelling, and/or grammatical errors
3 – A few typos, spelling, and/or grammatical errors
2 – Several typos, spelling, and/or grammatical errors
1 – Many typos, spelling, and/or grammatical errors

Completion
5 – No required contents missing; handed in on time
4 – Missing 1 or 2 of the required contents and handed in on time; or nothing missing and 1 day late
3 – Missing several required items and handed in on time; 1 day late and missing 1 or 2 items; or 2 days late
2 – Missing several items and 1 day late; 2 days late and missing 1 or 2 items; or 3 days late
1 – Missing several items and 2 days late; 3 days late and missing 1 or 2 items; or more than 3 days late with nothing missing

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Introduction
5 – Thoughtful, meaningful, reflective, with connections to class or readings; explains purpose to reader
4 – Thoughtful, meaningful, reflective; explains purpose
3 – Somewhat reflective; explains purpose
2 – Explains purpose without much reflection
1 – Does not explain purpose

Explanations
5 – Thoughtful, meaningful, reflective, with connections to class and readings
4 – Thoughtful, meaningful, reflective, with connections to class or readings
3 – Thoughtful, reflective
2 – Minimal reflection
1 – Some explanations missing

Evidence
5 – Meaningful, compelling, addresses criteria for which it is intended, and shows growth
4 – Meaningful, addresses criteria for which it is intended
3 – 1 or 2 items do not address criteria for which it is intended
2 – Evidence present but some does not address criteria for which it is intended
1 – Some evidence missing or most evidence does not address criteria

The *Assessment Standards for School Mathematics* (NCTM 1995) support this process of assessment. Having previously determined the structures and criteria to use for evaluation makes the task easier and the analysis more complete. Because students are given copies of these rubrics at the beginning of the semester, they know what is expected of them and how they will be evaluated.

Concern about time devoted to grading these types of assessment is addressed in Lax (1989, 253) where it is stated that "the time spent in helping students explain clearly what they mean and [in examining] the stated ideas will lead to major savings in instruction time later on." I believe the time devoted to evaluating performance-based assessment such as reflections and portfolios is worthwhile and one way I manage the

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time is to read the reflections during quizzes. Evaluating the portfolios at the end of the semester is a time-consuming process, but it is only done once a semester and they provide valuable feedback about students' understanding and the course.

Conclusion

Although there are challenges in using alternative forms of assessment in mathematics classes, the benefits achieved override the negative aspects. The *Assessment Standards* (1995) state that "assessment should promote equity." Using a variety of methods to assess students' understanding gives them ample opportunity to demonstrate their knowledge. Students who are weak mathematically can demonstrate what they know in a way that is more comfortable to them than taking a traditional test or quiz. Opportunity for self-assessment and reflection is found in the portfolios and reflections. Finally, if pre-service teachers are exposed to these practices as students, they will be more likely to adopt them as teachers.

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